



Infrastructure

Introduction



\$6.0

billion invested
since 2007 in DOT
capital projects

The success of New York depends on its infrastructure. Safe and well maintained roads, bridges and rails allow New York City's economy and industry to thrive and its residents to have a high quality of life. Greening the city's infrastructure is also crucial to meet the city's goal of reducing greenhouse gas emissions from operations 30% by 2017.

Since 2007, NYCDOT has invested a record resources into the maintenance and upkeep of transportation infrastructure. Despite the high visibility of public plazas and bike lanes, the majority of DOT's resources are used for road and bridge repair and reconstruction projects. NYC DOT is responsible for over 6,000 miles of roadway and nearly 800 bridges along with the 24/7 operation of the Staten Island Ferry. We have more than 12,000 signalized intersections and over 300,000 streetlights.

NYC DOT has invested \$6.0 billion over the past six years in capital projects, including \$3.1 billion for bridges, over \$2.1 billion in street reconstruction and repaving, \$430 million for lighting and traffic signals, and over \$110 million for the Staten Island Ferry.

DOT's 2008 Strategic Plan called for maintaining and modernizing the city's infrastructure and ensuring it is ready for the demands of this century and next. These goals include making roads smooth, saving money with timely bridge upkeep, using more sustainable materials in streets and cleaner fuels in our cars, trucks and ferries, and reducing the size of DOT's vehicle fleet.





Roosevelt Island Bridge

Since 2007, DOT has made progress on all of these fronts while making environmental stewardship a hallmark of its operations. Over 73% of city streets are in a state of good repair versus 66% in 2008, and DOT has increased the use of recycled asphalt. The number of bridges in poor condition has declined to record lows. DOT is implementing energy efficient street lights throughout the city with plans to upgrade all street and highway lights to LEDs by 2017. The Staten Island Ferry is one of the greenest in the nation and future upgrades will bring even more environmental benefits.

Chapter 12 21st Century Streets

Keeping city streets in good condition is vital to safe and efficient travel and is an essential function of DOT. The agency’s street infrastructure projects range from pothole repair to milling and repaving to full reconstruction of the street. Every year DOT lays millions of cubic yards of asphalt and repairs hundreds of thousands of potholes.

PlaNYC set ambitious goals for resurfacing at least 1,000 lane-miles of city streets per year. Through increased investment, the city has made progress towards improving street conditions. The city committed additional resources to resurfacing over the past six years, totaling over \$997 million since 2007. The improvement in street conditions reflects this investment. This funding has been used to resurface over 6,500 lane miles of streets. The percentage of our streets in a state of good repair increased from 66% in fiscal year 2008 to over 73% in fiscal year 2012.

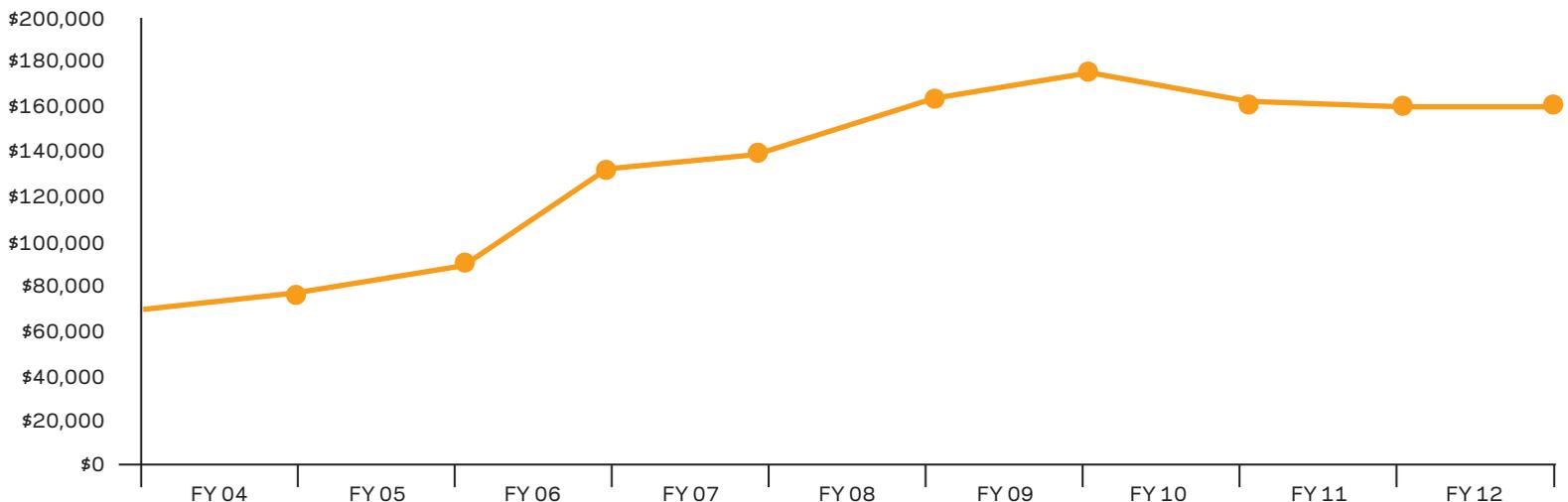
NYC LANE MILES RESURFACED, BY FISCAL YEAR

FISCAL YEAR	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
TOTAL	924.91	964.15	1,006.75	828.85	1,003.98	1,007.64

Even devastating events haven’t stopped DOT from continuing to make progress in street conditions. Hurricane Sandy hit the city in October 2012, and the percentage of streets in good condition dropped only slightly the following fiscal year, to 70%, despite extensive damage to the street system.

The harsh winter of 2010 also battered city streets, and the number of pothole complaints increased. Mayor Bloomberg responded with an additional \$2 million allocation to DOT for pothole repair. During the first quarter of 2011, DOT crews filled 50% more potholes than the prior year—an additional 40,000 potholes were repaired.

SPENDING ON ROAD RESURFACING





099-04-0034

Hertz
Equipment Rental
1985-1990

NEW YORK
BB-73087

ENSURE
BATTERY IS
FULLY
CHARGED TO
12.8 VOLTS

rented By
NEW YORK STATE
DOT

099-04

Equipment

NYPD

NEW YORK STATE
DOT

NYC DOT

FIRST AVENUE

DOT used an innovative, thin-asphalt overlay atop the notoriously uneven concrete road at a fraction of the cost of a complete rebuilding to repair First Avenue. The \$7 million project to repair the avenue from 72nd to 125th provides a smooth surface for pedestrians—including 48,000 runners at the NYC marathon—and makes it safer and more accessible for 60,000 daily bus, vehicle and bike riders. Select Bus Service was launched in 2010 and the street has been redesigned curb-to-curb in phases from Houston Street, adding high-visibility bus lanes for the M15 SBS, pedestrian refuge islands and parking-protected bike paths.



BEFORE: First Avenue



AFTER: First Avenue

Each year, New York City DOT's recycled asphalt program saves 174,000 tons of milled asphalt from going to landfills, reduces the amount of oil used in asphalt production by 840,000 barrels and eliminates 321,000 trucks trips

GREEN ASPHALT

NYC DOT requires approximately one million tons of asphalt annually to keep its 6,000 miles of streets smooth. The agency is the national leader in producing recycled asphalt in a cost effective and environmentally sound manner.

Asphalt is a combination of hard rock and petroleum-based asphalt cement. During resurfacing, some of pavement is removed and can be recycled to make new street surfaces. The recycling process reduces the amount of new pavement manufactured, which in turn, reduces greenhouse gas emissions and truck trips.

DOT's 2008 Strategic Plan set goals to increase the use of reclaimed asphalt pavement (called RAP), to 50% for in-house production and 25% for contractors. In-house asphalt production averaged 40% RAP in 2012. For vendor content, DOT averages 31% recycled asphalt.

The only other large American city using more than 20% recycled content in its paving material is Los Angeles. DOT's recycled asphalt

pavement saves us 174,000 tons of milled asphalt from landfilling a year, avoids 840,000 barrels of oil annually used to produce new asphalt cement, and eliminates 321,000 truck trips.

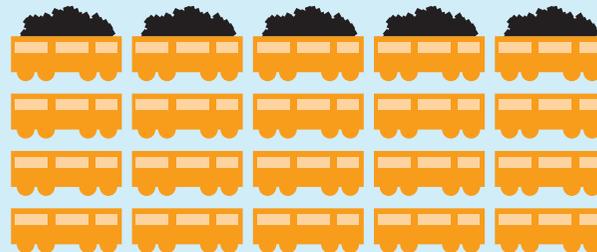
Recycled asphalt is good for the environment and saves the city money. In fact, DOT-produced asphalt proved so efficient at the Hamilton Avenue plant in Brooklyn—delivering savings of \$10 million a year—that DOT moved to acquire a second asphalt plant at the Harper Street asphalt plant in Queens.

The acquisition of the Harper Street facility also allowed the agency to close the Hamilton Avenue plant for modernization. After a renovation of the Hamilton Avenue asphalt plant is complete in late 2013, the upgraded facility will allow NYC DOT's use of RAP to increase to 50%.

DOT is piloting the use of 100% recycled asphalt in Staten Island along Richmond Avenue and Jewel Ave in Queens. Initial tests showed additional cost savings and environmental benefits.



Saves enough oil to power the Empire State Building



Keeps over 400 subway cars full of asphalt out of landfills



Eliminates 321,000 truck trips

22,000

gallons of annual fuel savings from new paving equipment

GREEN PAVING EQUIPMENT

DOT has dramatically reduced the environmental impact of the equipment it uses to pave the streets. New “electric screeds” offer the City’s greatest fleet-based savings in greenhouse gas emissions and help it meet air quality goals outlined in PlaNYC.

Paving machines operate with two basic parts—the tractor that stores and prepares asphalt and a “screed” that trails behind to lay asphalt at the correct thickness and angle. The screeds must stay heated for proper application of asphalt. Traditionally, DOT had used diesel fired screeds. With a \$1.14 million grant from the American Recovery and Reinvestment Act, DOT was able to retire these units

early to replace them with more modern, electric screeds. The new electric screeds allow better quality and temperature control, require less maintenance and cleaning, and also lay out a better “mat” of asphalt during the paving process. They are also healthier for DOT staff since they remove fumes and pollutants.

The change eliminates over 460,000 lbs. of CO₂ and 125,000 lbs. of particulates per year, roughly equivalent to the emissions produced by 40 cars driven 10,000 miles. It provides an annual fuel savings of about 22,000 gallons worth about \$90,000. Over the 10-year expected life of the equipment, 3,235 metric tons of greenhouse gases will be reduced.

New paving equipment eliminates 460,000 pounds of carbon dioxide and 125,000 pounds of particulates a year



Paving machine with electric screed



Hamilton Plant

The City has installed 5,700 bioswales since 2011

PERMEABLE PAVEMENT AND BIOSWALES

Incorporating sustainable elements into streets is another way to improve the city's environmental performance. The New York City sewer system is old, and during heavy rainstorms wastewater and stormwater combine and flow directly into the city's water bodies, polluting them. The city set a goal to reduce these "combined sewer overflow" (or CSO) events and increase the use of green infrastructure to 10% of impervious surface in combined sewer watershed areas. Streets managed by DOT encompass about 28% of the land in New York City—the agency plays an important role in siting green infrastructure.

Bioswales, stormwater greenstreets, and permeable pavement absorb stormwater during rain storms and help prevent combined sewer overflow events and street flooding. Bioswales and greenstreets use landscaped elements that help to beautify and calm streets. In the past few years, DOT has collaborated with DEP and other city agencies to approve over 5,700 bioswales and over 200 stormwater greenstreets.

DOT has also experimented with the use of permeable pavement as a more flexible alternative to bioswales, which generally require large areas. Our initial screenings show that although permeable pavement has limits—streets above subways and with underground utilities are not good conduits, for example—it performs well in low-density areas where ponding is an issue.

In the winter of 2012, DOT maintenance crews installed precast permeable concrete slabs on the corners of Hollis Avenue & 209th Street and Linden Boulevard & 204th Street in Queens to respond to persistent flooding conditions. After installation, stormwater now infiltrates into the ground. Standing water is absorbed within



Bioswales use planted areas to reduce drainage

a matter of hours. The agency is also using permeable pavement in College Point, Queens after the award of an EPA Green Infrastructure Grant through the New York State Environmental Facilities Corporation.

In 2013, local law codified DOT's interest in exploring permeable pavement. The city is now required to study and issue a report in spring 2016 detailing its experience with permeable materials in streets and sidewalks.

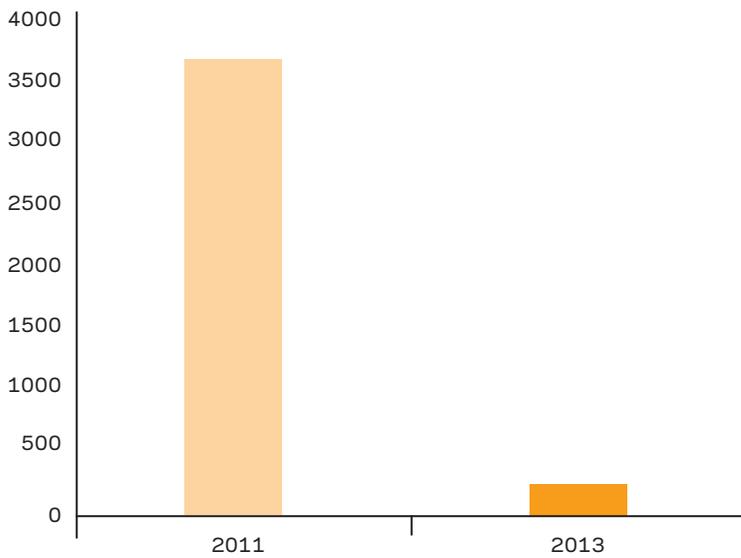


**DOT has repaired
2,196,483 potholes
since 2007**

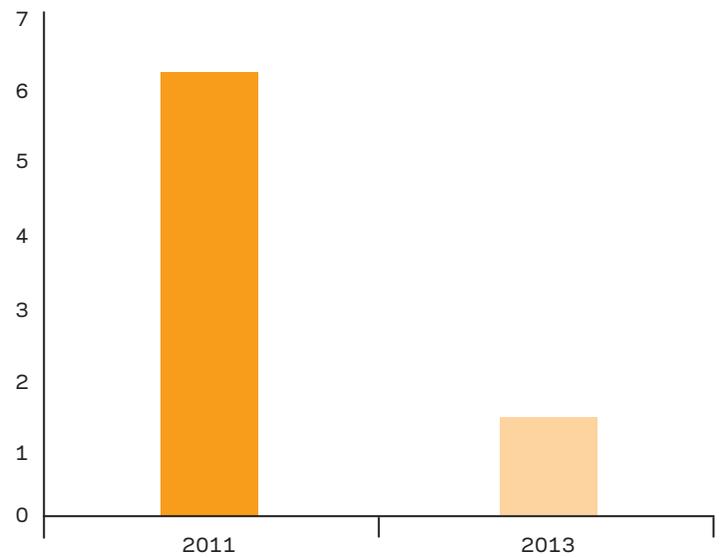
PROGRESS ON POTHOLES

Fixing potholes on New York City's 6,000 miles of streets is a never-ending job. DOT repairs hundreds of thousands of potholes every year, and during the summer, fixes up to 4,000 potholes a day. Through a streamlined process and increased investment, the agency has made strides in reducing the time it takes to respond to pothole complaints, helping keep streets safe and smooth for New Yorkers.

OPEN POTHOLE COMPLAINTS



RESPONSE TIME TO POTHOLE COMPLAINTS (DAYS)



The Daily Pothole makes street repair work accessible to the public at thedailypothole.tumblr.com

THE DAILY POTHOLE

The Daily Pothole tumblr page allows New Yorkers to follow DOT's hardworking men and women as they mill, pave, and smooth city streets. Immediately after its launch in 2011, The Daily Pothole was heralded as a funny, inventive way to show nuts and bolts infrastructure work that keeps New York's transportation system working. Planetizen ranked The Daily Pothole one of the Top Ten Websites of 2011 and Complex.com named it one of the best 100 Tumblrs of all time. As of July 2013, the Tumblr had 16,447 followers.



Warmy the asphalt plug is the Daily Pothole's mascot

The Daily POTHOLE MILL & PAVE


 A publication of New York City DOT
 



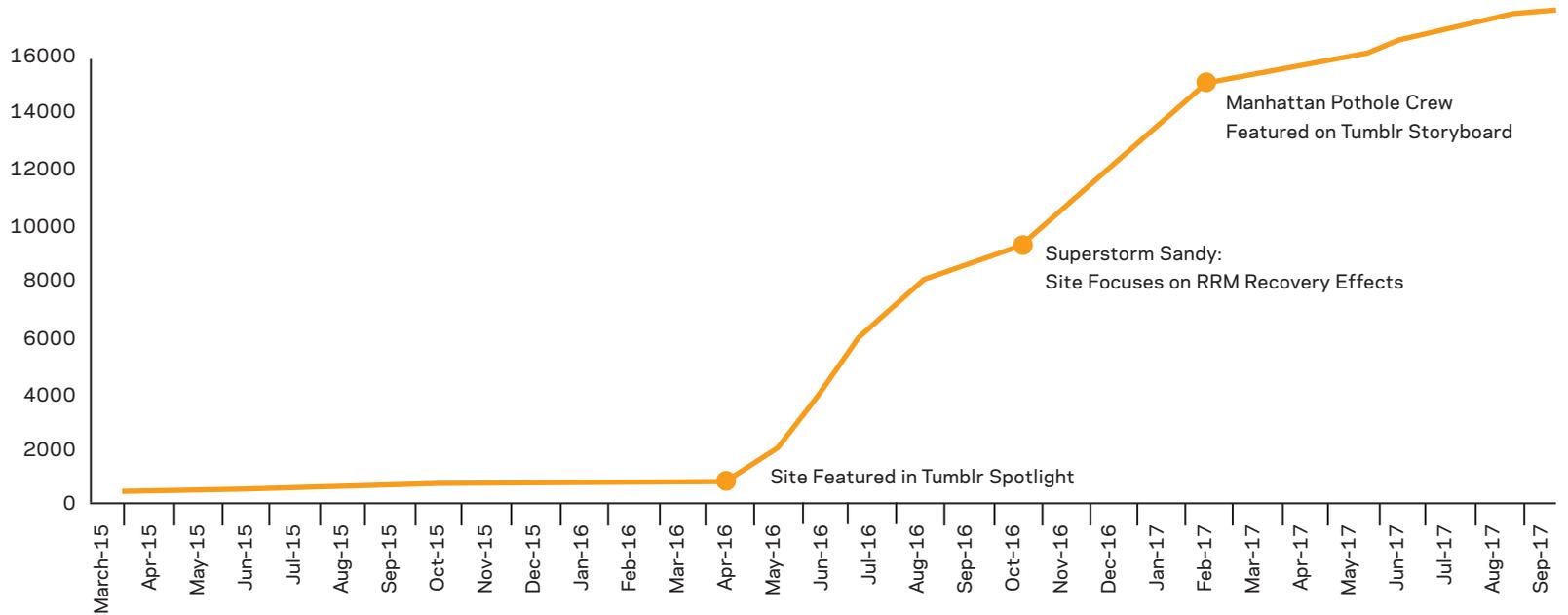

Follow us as we work to make New York City's streets smooth.
1,845,114 square yards resurfaced since July 1, 2013 (9/13/2013)


[Report a Pothole](#)


[Check Your Street's Condition](#)

The Daily Pothole Tumblr

THE DAILY POTHOLE SUBSCRIBERS



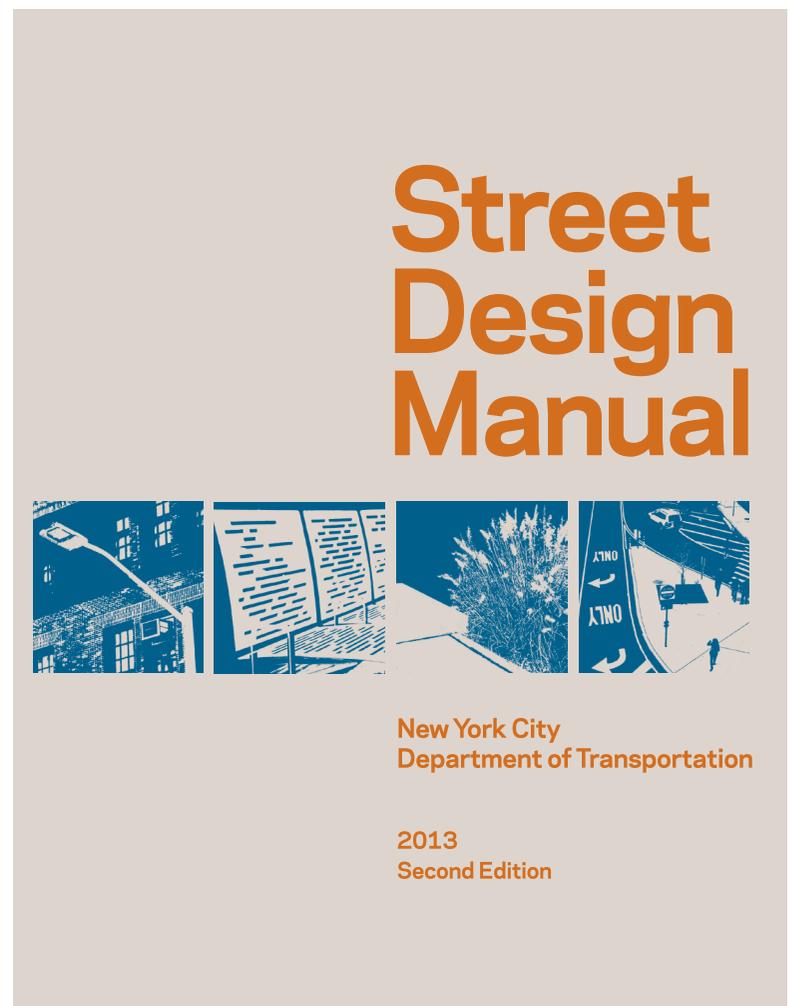
STREET DESIGN MANUAL

The New York City Street Design Manual is the city's comprehensive resource for street design standards, guidelines, and policies. It draws from a wide range of resources and experience to present a coherent set of choices for street design. These comprise everything from ubiquitous features, such as standard sidewalk concrete and street lights, to newer design elements like pedestrian safety islands, bus bulbs, and protected bicycle lanes.

The Manual's first edition, published in 2009, has been a tremendous success, with rapid integration into the city's DNA. City agencies and private developers now work from a common, comprehensive playbook. A standard reference text for DOT staff, the Manual has been incorporated into the agency's internal design-review processes and is required reading for all design and engineering consultants. The Manual is also cited in the Mayor Bloomberg's Executive Order encouraging active design strategies for streets and buildings.

The Manual is a living document. DOT updated the first edition a year after its publication, and the second edition, released in fall 2013, reflects further evolving practices and aspirations. Future editions will continue to document the changes that come as the city keeps turning its goals into best practices. They will also promote still more innovations to make our streets safer, smarter, and stronger as local economic and social assets.

The following agencies participated in the developing the Manual: Departments of Design and Construction, City Planning, Parks and Recreation, and Environmental Protection, and Buildings, as well as the Economic Development Corporation, the Landmarks Preservation Commission, the Public Design Commission, and the Mayor's Office.



STREET WORKS MANUAL

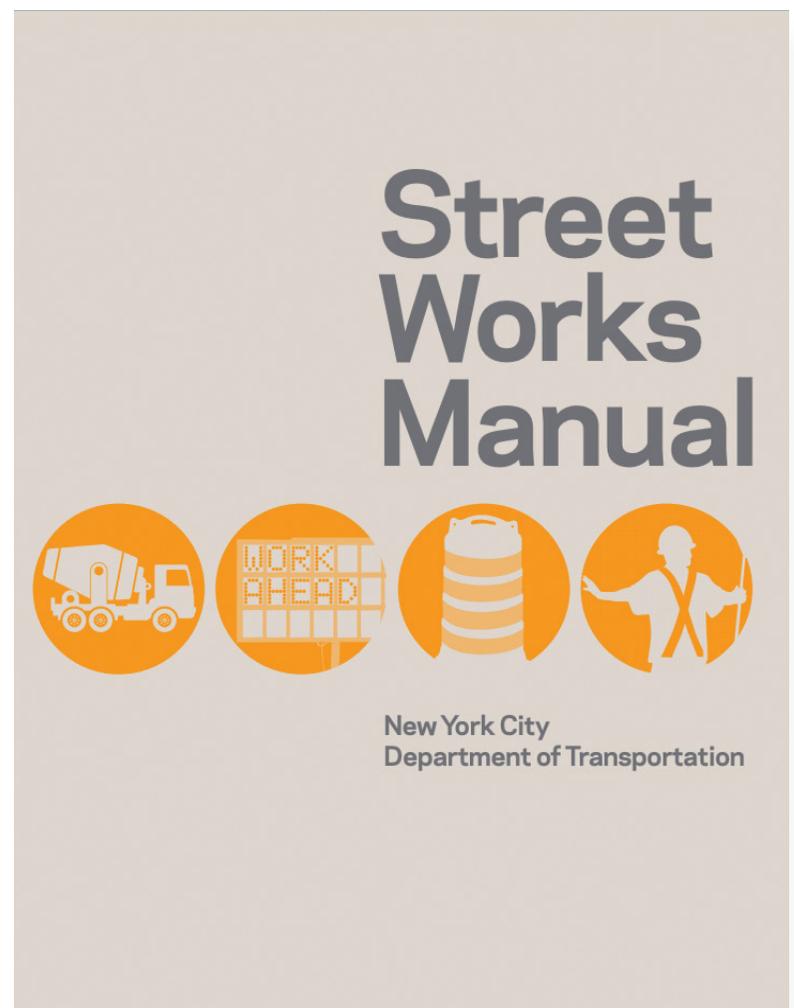
City streets are New York's basic circulatory system, serving huge numbers of daily foot, bus and auto trips, as well as facilitating the millions of large and small goods deliveries that keep our economy running. Our streets are also the conduits for the increasingly complex set of public utilities needed for daily life in the 21st Century—water, electricity, gas, steam and telecommunications of every kind.

At times these multiple functions conflict—nearly every New Yorker seems to have a story about a work crew digging up a freshly surfaced city street.

Though better coordination of paving and sub-surface work seems elementary, it has been elusive owing to sheer scales of both our street system and the utility networks buried beneath them.

The New York City Street Works Manual represents a major step in solving this problem. NYC DOT and the city's major utility companies produced new policies set forth in the Manual and a series of agreements about data-sharing and consultation on work on both roadways and below the street surfaces. These have gone a long way to protect the public's investment in better street surfaces. New information applications are facilitating the coordination of vast and complex work schedules across the city.

In the same vein, the release of the Manual in 2012 also marked the adoption of new, business-friendly technology improvements in NYC DOT's issuance of permits to contractors who need to undertake work in or under city streets. All-electronic permitting saves time and money for the utility and construction industries, while reducing costs and saving taxpayer dollars.





The Sheridan/Hunts Point Land Use and Transportation Study recommends turning the Sheridan Expressway into a boulevard lined with new housing, retail, and offices



Proposed redesign for Sheridan Expressway at West Farms Rd, Bronx

SHERIDAN EXPRESSWAY

DOT worked with City Planning, the Economic Development Corporation, and local stakeholders to undertake the 'Sheridan-Hunts Point Land Use and Transportation Study' starting in 2010. After a \$1.5 million federal TIGER II award from US Department of Transportation, the agencies evaluated ways to address community concerns over land use, waterfront access, transportation and economic development, and take advantage of emerging opportunities for new housing and retail. The study sought ways to mitigate an over saturation of infrastructure in the Hunts Point neighborhood of the South Bronx.

The recommendations built off prior state and community based studies that addressed local transportation problems and proposed improved access to new parks along the Bronx River. The final recommendations were to turn the 1.25 mile highway into a boulevard, improve pedestrian crossings and safety, and encourage additional housing, offices and retail.

The completion of the study sets the stage for the transportation project development process, which will require environmental review and preliminary design. The City will pursue a cooperative agreement to advance the project with the State, which owns the expressway.



Chapter 13

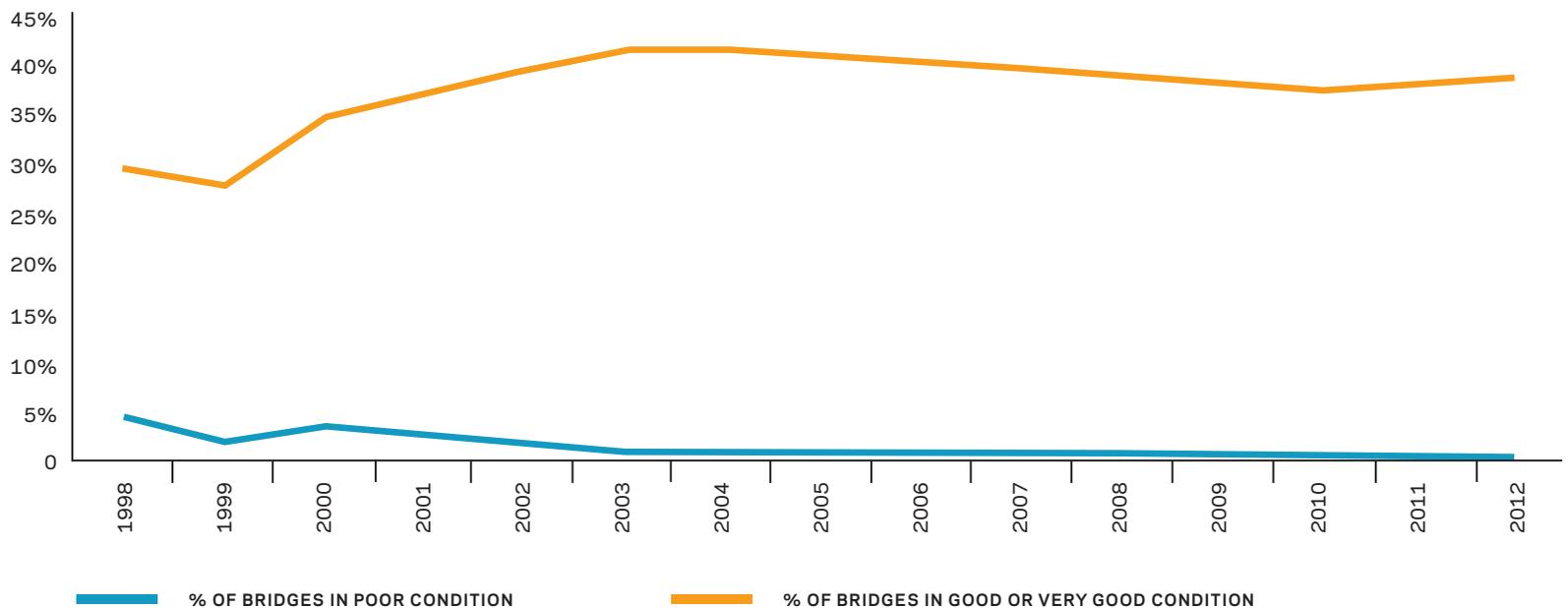
A City of Bridges

DOT has committed \$3.1 billion to repair the city's bridges since 2007

DOT has committed \$3.1 billion for the city's bridge program since 2007 and instituted internal controls to use dollars more efficiently. The investment has paid off. 66 bridges, including the Brooklyn Bridge, Willis Avenue Bridge, and the ramps at St. George Ferry Terminal, have been rehabilitated or replaced creating a smoother and safer ride for motorists. Once the Brooklyn Bridge rehabilitation is complete, all the city's bridges will be restored to a state of good repair—a new record.

DOT is responsible for 788 bridges and tunnels throughout New York City. Keeping these bridges safe and in a state of good repair is vital to safe and efficient movement of goods. Over the next ten years, the city has committed \$4.3 billion to this goal. Over 70 bridges that would otherwise fall into "poor" condition are funded for reconstruction. However, funding challenges over the long-term remain (see Looking Ahead section).

NYC BRIDGE CONDITIONS



To ensure the best communication with local residents about the Brooklyn Bridge reconstruction project, DOT hired a full time community liaison, set up a working group with key stakeholders, and developed a mailing list of over 1,000 people

EAST RIVER BRIDGES

The East River Bridges are iconic, landmark symbols for New Yorkers and tourists who walk, bike and drive over them every day. Over the past few decades, over \$1 billion has been invested to keep the East River Bridges safe for the millions of people that use the bridges annually. This investment was strengthened under the leadership of Mayor Bloomberg.



Brooklyn Bridge



DOT worker fixing Brooklyn Bridge

BROOKLYN BRIDGE

More than 120,000 vehicles, 4,000 pedestrians and 3,100 bicyclists cross the Brooklyn Bridge every day. The agency is undertaking a \$500 million overhaul of the bridge to keep it safe, attractive and well maintained for all users. This project includes upgrading existing roadway pavement, rehabilitating historic arch blocks, railings, and masonry structures, restriping and expanding capacity at on and off ramps, and increasing the overhead clearance at the York Street arch over the BQE, which is currently lower than industry standards. In addition, the DOT project includes seismic retrofitting at the Franklin Square arch over Pearl Street. On all the bridge approach structures on both the Manhattan and Brooklyn sides, the existing deck will be removed by lifting out sections and replacing them panel by panel with precast concrete-filled steel grid deck panels. The bridge is also being painted to prevent steel corrosion and improve aesthetics.

Brooklyn Bridge Working Group:

The rehabilitation of the Brooklyn Bridge is a large infrastructure project in a dense urban area. To lessen the impacts of the project on its Manhattan and Brooklyn neighbors, NYC DOT employed construction equipment innovations such as smaller jackhammers, sound proofing blankets, and to the extent possible, doing work during the day. To ensure the best communication with local residents, the agency hired a full time community liaison, set up a working group with key stakeholders, and developed a mailing list of over 1,000 people.



Manhattan Bridge

MANHATTAN BRIDGE

Nearly a billion dollars has been invested in the Manhattan Bridge over the past few decades for reconstruction and repair. The latest \$149 million contract began in January 2010 and builds on the investment in the historic bridge.

It includes the total replacement of all 628 bridge suspenders, main cable re-wrapping, replacement and upgrade of the necklace lighting, and installation of maintenance platforms at the bridge towers. Previous

phases of the rehabilitation have strengthened the bridge, reconstructed the roadways, the subway tracks, and the walkway, and developed a new bikeway on the north side.

224%

increase in cycling
daily over the
Williamsburg Bridge
since 2007

WILLIAMSBURG BRIDGE

Ongoing maintenance of the Williamsburg Bridge builds on previous reconstruction and repair projects and ensures the crossing will remain in good condition for future generations. The bridge is one of the busiest in the city, carrying over 150,000 motorists, nearly 100,000 transit riders, and

over 5,000 cyclists on weekdays.

The most recent \$173 million project includes rehabilitating the tower bearings, the truss system, and the steel structure of all the bridge's eight towers. Architectural work includes the restoration of decorative lights and the Brooklyn granite stone monument. Work

inside the anchorage houses on both the Manhattan and Brooklyn sides includes the construction of new stairs, ventilation and lighting. The project also includes the installation of an Intelligent Transportation System (ITS).

Previously, over \$500 million was spent to fix deterioration due

to deferred maintenance and the effects of age and weather, and increased traffic. The investment rehabilitated the main cables, reconstructed the roadways and completely rebuilt the walkway, bikeway and subway tracks.

ED KOCH QUEENSBORO BRIDGE

The Ed Koch Queensboro Bridge is the busiest crossing of the East River bridges, carrying 221,920 motorists, 11,980 bus passengers and 4,342 cyclists and 1,591 pedestrians every day. Ongoing work to keep the bridge in good condition includes drainage improvements on the main

bridge and Queens approach, new overhead signs and lighting, and cleaning and repairing the bridge structure.

The current projects build on the \$300 million invested in recent decades to reconstruct ramps and roadways and rehabilitate the bridge bearings.



Ed Koch Queensboro Bridge



\$14.3

million in federal stimulus
funding for the Wards
Island pedestrian bridge

HARLEM RIVER BRIDGES



Willis Avenue Bridge Under Wards Island Bridge



3rd Avenue Bridge

WARDS ISLAND BRIDGE

In early 2012, NYCDOT completed a \$1.5 million rehabilitation of the Wards Island pedestrian bridge including bridge deck renovations, a new electrical system, and better lighting and security. The project was funded by the American Investment and Reinvestment and Recovery Act and allowed a better experience for pedestrians using the bridge to travel between East 103rd Street in Manhattan and Wards Island.

THIRD AVENUE BRIDGE

DOT completely replaced the Third Avenue Bridge in 2004, part of a \$118 million project to improve mobility for traffic between Manhattan and the Bronx. The new bridge span was the first one to be floated into New York Harbor after being constructed in Alabama.

WILLIS AVENUE BRIDGE

In 2011, NYCDOT completely replaced the Willis Ave Bridge, which connects East 124th Street in Manhattan to Willis Avenue in the Bronx, as part of a \$612 million project. The 350-foot swing span of the new bridge, which opens on a pivot to let marine traffic pass, was constructed in Coeymans, New York, and travelled by barge to its Harlem River home. The span's 135-nautical-mile journey down the Hudson River, through New York Bay, and up the East River included passage underneath 14 bridges.

The new bridge features a direct connection from the FDR to the northbound Major Deegan Expressway in the Bronx. It has wider lanes than the old bridge, and a combined pedestrian/bicycle pathway along its north side. The project is ongoing, as DOT completes reconstruction work on surrounding ramps and approaches.



Willis Avenue Bridge

145TH STREET BRIDGE

As part of a \$70 million project, the bridge was entirely closed to traffic in November 2006 and the center swing span was removed. In February 2007, when the preparatory work was complete, the new 145th Street Bridge was floated up the Harlem River to its final destination. The reconstructed bridge includes a new swing span, new machinery and electrical system, a new approach roadway and spans, railing, fencing, lighting, and signals. A new Operator's House has been centered and installed.



145th Street Bridge

DOT's reconstruction project on seven Belt Parkway Bridges will improve safety and reliability for 150,000 drivers a day

BELT PARKWAY BRIDGES

The New York City Department of Transportation began the reconstruction of seven bridges and over the Belt Parkway in 2009. In total, the projects will cost nearly a billion dollars and improve safety and reliability for 150,000 drivers who use the Belt every day. The Fresh Creek Basin, Rockaway Parkway, Paerdegat Basin, Gerritsen Inlet, Mill Basin, Nostrand Avenue and the Bay Ridge Avenue Bridges are all original structures built starting in 1939. In 2009, a construction contract began for three—the Belt Parkway over Fresh Creek Basin, Rockaway Parkway, and Paerdegat Basin. Additionally, in order to mitigate wetland impacts, an offsite project at Floyd Bennett Field within the Gateway National Recreational Area (GNRA) was started in March 2011.

Reconstruction of these bridges will improve safety and visibility. Lanes and the bike path will be wider, safety shoulders and median barriers will be constructed, and the roadways will be realigned to improve sight distances. NYCDOT anticipates that these improvements will reduce the current accident rate on this section of the Belt Parkway and improve highway drainage.



New Paerdegat Basin Bridge in Canarsie.

One of seven bridge projects along the Belt Parkway.

Widespread use of sophisticated sensors helps enforce against overweight trucks and protects bridges facilities

WIRING BRIDGES TO IMPROVE UPKEEP



Monitoring the dynamic behavior of the Brooklyn Bridge

DOT has used technology to more efficiently detect problems on our bridges. GPS, laser scanning, ultrasonic testing, and fiber optics have all been used on the East River Bridges in order to track tiny movements of the bridge structures resulting from vehicles, weather, river activity and seismic movements. The data has allowed DOT to more effectively monitor and maintain our bridges. For example, measurements from these scans confirmed that the torsion in the middle of the Manhattan Bridge declined.

DOT is also using weigh in motion sensors on the Alexander Hamilton Bridge to collect data about the impact of overweight trucks on bridge conditions. As truck weight increases, damage to bridge structures accelerates exponentially, stressing bridge roadways and structures, so better data about and enforcement against overweight trucks is a vital component of any bridge maintenance program.

The sensors, installed in the roadbed of the bridge in 2013, weigh each truck that travels over it. Data is then transferred electronically to DOT staff for analysis and used to develop assessments of the number of overweight trucks, and the impacts of those trucks on the bridge structure. Widespread use of the sensors has the potential to help improve enforcement against overweight trucks and protect city facilities from the disproportionate damage they cause.



Strain gauge monitoring of beam on the Brooklyn Bridge



NYC transportation
projects saved from cuts
by stimulus funding

FEDERAL STIMULUS FUNDING

New York City received \$1.1 billion for transportation projects from the American Recovery and Reinvestment Act in 2009, including \$261 million for NYC DOT. The allocation was the largest to any city in the country and allowed the city to create or preserve approximately 32,000 jobs. New York was able to take maximum advantage of the opportunity because of its sophisticated project development process and expertise in federal transportation law. Existing funding for stimulus projects allowed 25 other projects to proceed, projects that would have languished due to the economic downturn. Examples include the reconstruction of Eastern Parkway in Brooklyn and East Houston Street in Manhattan and construction of the Hunts Point Greenway in the Bronx. Six NYC DOT projects received direct stimulus funding.

Rehabilitation of Saint George Ferry Terminal Ramps

At \$175 million, the project at the St George Ferry Terminal was the largest stimulus project in New York State. The Terminal is Staten Island's transit hub linking 70,000 daily commuters with the Staten Island Railroad, 20 New York City Transit bus lines, 3 parking facilities and the Bay Street and Richmond Terrace bikeway.

The project consists of the rehabilitation of 8 ramps and was completed using the Design Build approach, a modern method of project delivery in which the city enters into a single contract with one entity for both design and construction services. This permits construction to begin while design continues in close coordination, enabling the construction to be completed in less than 3 years under strict cost control. Replacement of the ramps will reduce long term expenditures for the city.

Total Project Cost: \$175 million
Direct Stimulus Funding: \$175 million

Rehabilitation of the Brooklyn Bridge

This project includes rehabilitating ramps and repainting the bridge to improve traffic conditions for 100,000 vehicles and 4,000 pedestrians and 2,600 bicyclists who cross the Brooklyn Bridge every day.

Total Project Cost: \$500 million
Direct Stimulus Funding: \$30 million

Upgrades to the Ward's Island Pedestrian Bridge

The project improved pedestrian access to Ward's Island from East Harlem through a complete mechanical and electrical rehabilitation, including replacing the complete tower drive machinery, providing a new reinforced concrete deck, and a new drainage system. The project was done in tandem with a \$100 million upgrade to Ward's Island recreational facilities, including construction of Icahn Stadium and dozens of new ball fields. The project improved pedestrian safety and durability and extended the useful life of the existing bridge.

Total Project Cost: \$14.3 million
Direct Stimulus Funding: \$14.3 million

Rehabilitation of 12 Roadway Bridges

Rehabilitation of deteriorated components of 12 bridges throughout the City extended their useful life by 10 years. Rehabilitation work addressed concrete abutments, piers and columns, bearing replacements, resurfacing steel repairs and waterproofing.

Total Project Cost: \$9.7 million
Direct Stimulus Funding: \$9.7 million

\$261

million stimulus allocation to NYC DOT for transportation projects

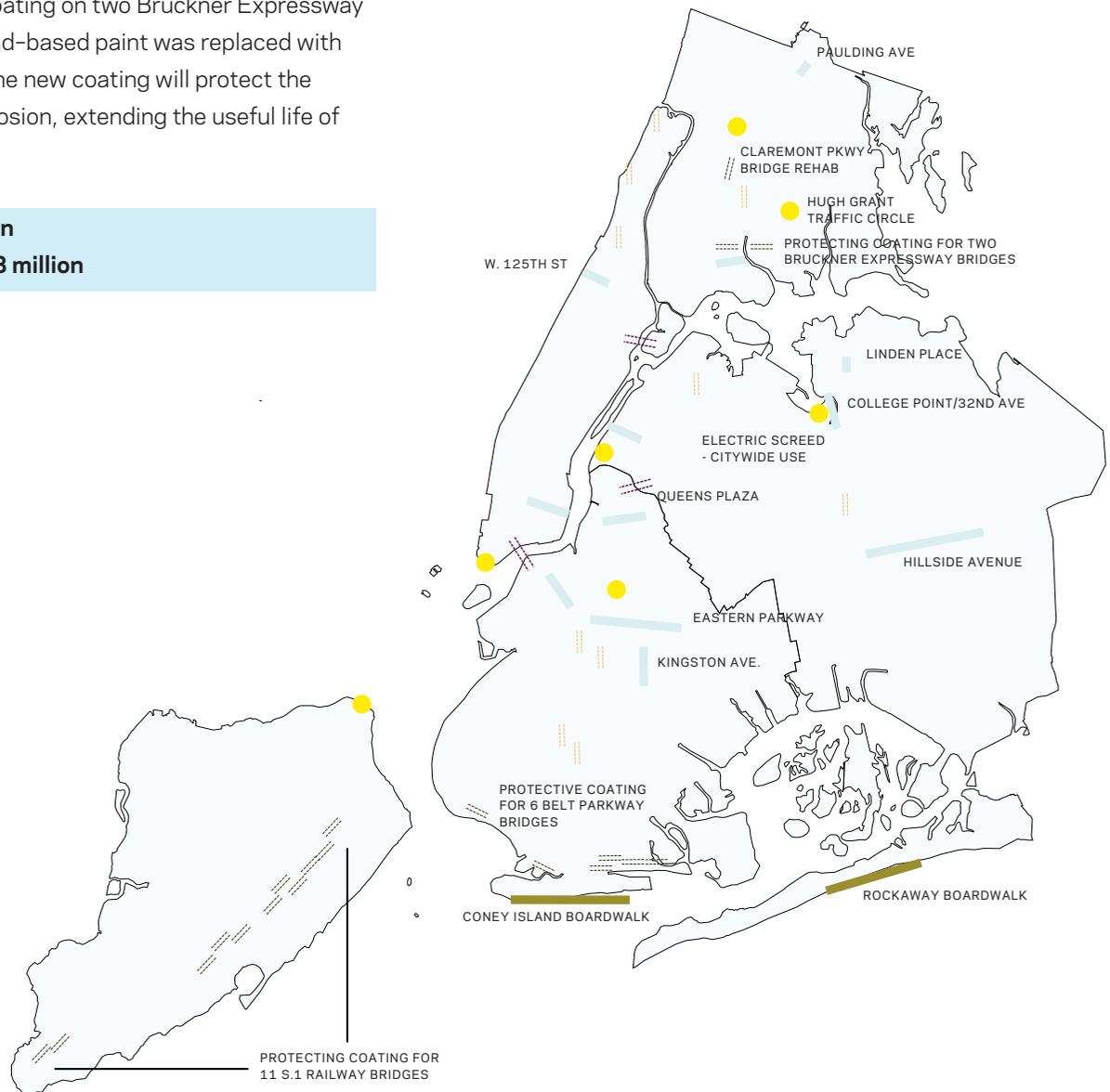
The stimulus allocation was the largest to any city in the country and allowed New York City to create or preserve 32,000 jobs

Replacement of Protective Coating on Two Bruckner Expressway Bridges

Replacement of the protective coating on two Bruckner Expressway Bridges over the Bronx River. Lead-based paint was replaced with a lead-free protective coating. The new coating will protect the structural steel from further corrosion, extending the useful life of the structures by 20 years.

Total Project Cost: \$8.8 million
Direct Stimulus Funding: \$8.8 million

FEDERAL STIMULUS FUNDING FOR DOT PROJECTS





BOARD
HEIGHT
1

Chapter 14

Built-in-Efficiency: Lighting, Signage, Ferries and Vehicles

Sustainable Streets promised that NYCDOT would lead by example, and strive to become a national model for efficient, environmentally sound infrastructure management. As detailed in the chapters above, DOT has risen to this challenge in its street maintenance and bridge maintenance programs.

The agency has also brought a new approach to lights, signs, fuels and its fleet. It has become a leader in the use of energy efficient street and traffic signal lighting, saving millions of dollars in electricity costs and reducing greenhouse gas emissions. Clean fuels for our ferries and agency fleet, along with our car sharing program, have brought significant environmental benefits and are poised to generate additional gains going forward.

\$14

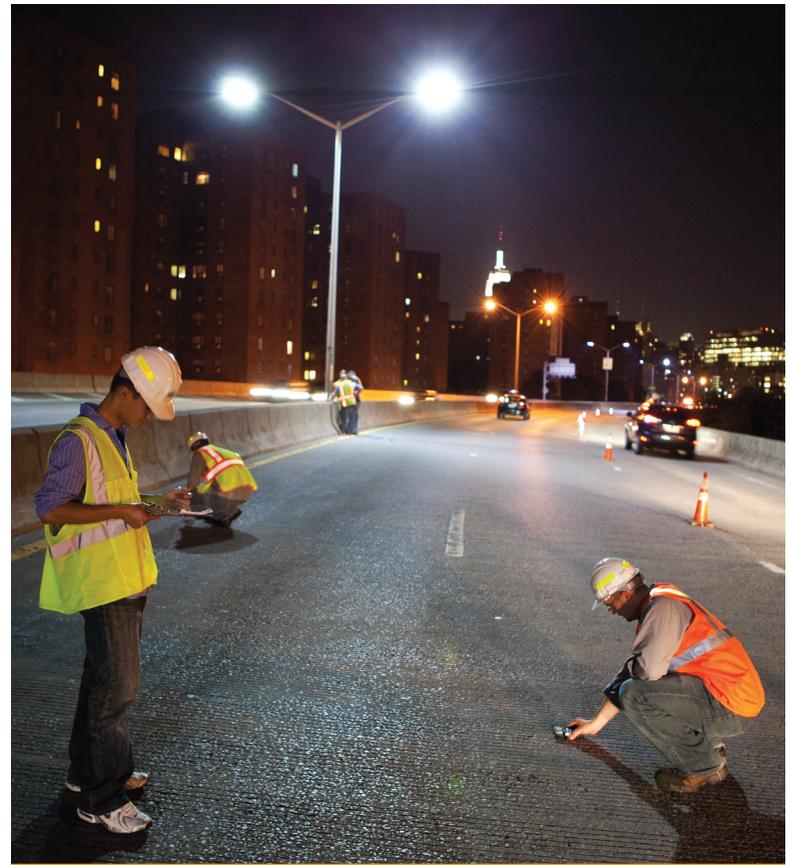
million in annual savings
from conversion to
LED's

LIGHTING

The city has over 300,000 street lights and 12,000 signalized intersections. Keeping streets bright and safe for travel and city life require a substantial amount of electricity. Since 2007, the city has been converting to energy efficient models to reduce energy costs and lessen the city's greenhouse gas emissions. Upgrading traffic and street lights to light-emitting diodes (LEDs) will help the city reach its 30% energy reduction goal in city buildings and operations by 2017, a goal outlined in PlaNYC.

LED upgrades came to traffic lights at DOT's signalized intersections in 2009, producing an annual energy savings of 81%. By the end of 2014, all of DOT's highways and some of our streets will have LED lights. This will save approximately \$2.2 million annually in energy and maintenance costs. Additionally, Far Rockaway and the Staten Island boardwalk will get LED lights as part of the Sandy recovery program.

By 2017, 250,000 streetlights will be converted, completing the largest LED retrofit in the United States. In total, this will save approximately \$6 million in energy and \$8 million in maintenance a year for a total of \$14 million. Compared to the current standard high-pressure sodium lights currently on streets, which last six years, LEDs can last up to 20 years before needing replacement, potentially producing up to an 80 percent savings on maintenance.



DOT employees checking light levels on the FDR Drive as part of the agency's LED pilot program.

DOT has removed 50,000 unnecessary and redundant signs from New York City streets

CLEARER AND MORE ATTRACTIVE SIGNAGE



New commercial vehicles parking signs (right) replaced older signs (left).

Clearly explaining the many laws, rules, and regulations to drivers on the streets of New York is no easy task. The quantity and content of NYC street signage has provided material for many late night comedians, and been the source of confusion for residents and tourists alike.

DOT has worked diligently to reduce sign clutter and make parking and street signs easier to understand. In 2013, Commissioner Sadik-Khan and City Council members announced newly designed and simplified parking regulation signs in Midtown's

commercial parking areas. The initial rollout replaces 6,300 parking regulation signs of varying colors, typefaces, font sizes and sometimes confusing phrasing with streamlined and standardized two-color signs that are phrased and formatted for easier readability. The simplified signs are located throughout Manhattan's paid commercial parking areas, running generally from 60th Street downtown to 14th Street and from Second to Ninth Avenues, with additional areas in the Upper East Side, Lower Manhattan and the Financial District.

The 6,300 signs that DOT will replace in Midtown and Lower Manhattan include 3,300 commercial parking signs and 3,000 other signs for nighttime and weekend parking for the general public, hotel and taxi stands, street cleaning and no standing areas. The new signs reduce the number of characters needed to explain the rules from 250 to about 140, making the sign appear less visually cluttered while reducing five-foot-high signs by about a foot. The new design also places the day of the regulation before the hours of the regulation, eliminating abbreviations and retaining all necessary parking information while making it easier to read. The signs were designed working with Pentagram Design, which has also worked with DOT on its safety campaigns.

DOT has also reduced the number of signs on city streets. Excessive signage distracts drivers from essential control signs, such as stops signs and one-way signs, and clutters streets. Signs also lose effectiveness over time as they blend into the built environment.

DOT has removed over 50,000 signs that are redundant or unnecessary on NYC's streets. These include snow route and bump ahead signs, along with signs to recycle and curb your dog. When the initiative is complete, 60,000 signs will be removed, making streets safer, directions clearer and reducing maintenance costs for DOT.





million riders use the
Staten Island Ferry
annually

FERRIES

DOT owns and operates the Staten Island Ferry and works with other public agencies and private operators to promote use of the city's waterways for transportation. The Staten Island Ferry carries over 22 million passengers annually on a 5.2-mile run between the St. George Terminal in Staten Island and the Whitehall Terminal in Lower Manhattan. The Ferry runs 24 hours a day, 365 days a year. The Staten Island Ferry is the most reliable form of mass transit, with an on-time performance of over 96 percent. On a typical weekday, five boats make 109 trips, carrying approximately 70,000 passengers.

GREENING THE STATEN ISLAND FERRY

In 2010, the Staten Island Ferry converted to ultra-low sulfur fuel, delivering significant environmental benefits. We have experimented with biodiesel, installed diesel oxidation catalysts on all of our large ferries, and embarked on a partnership with the Port Authority to reduce emissions as an offset for its dredging projects. These upgrades include installation of after-treatment systems on the two small ferries and mechanical upgrades on the balance of the fleet.

DOT commenced a design process for the conversion of our boats to liquified natural gas which would essentially eliminate the emission of sulfur dioxide, nitrogen dioxide and particulate, while reducing CO₂ discharge by 25-30% and costs by 35-40%. By summer 2014, we will have retrofitted at least one boat to run on the liquefied natural gas, further making the harbor cleaner and Staten Island Ferry the greenest fleet in the country.

On a typical weekday the Staten Island Ferry carries 70,000 passengers

THE NEXT GENERATION OF STATEN ISLAND FERRY BOATS

DOT has begun a design process for construction of a new class of ferry boats to serve the next generation of Staten Island ferry riders. The boats will replace three Barberi boats that are at the end of their useful lives. A design firm was selected in March 2013 to design the boats. After design is complete, NYCDOT will seek resources to

procure them at an estimated cost of \$300 million for three boats. Delivery of the first boat is scheduled for 2018. The new boats will have cycloidal propulsion systems to allow it to quickly change thrust and direction, improving maneuverability in choppy water and high winds.

GREENING PRIVATE FERRIES

DOT partnered with the New York State Energy and Research Development Agency and city agencies to repower and retrofit private ferries in the NY Waterway and BillieBey fleets. As part of the program, 9 boats were repowered

and 34 received diesel oxidation catalysts. One Sea Streak boat was also repowered using a grant from the United States Environmental Protection Agency. The change resulted in fuel and emissions savings.

DOT operates eleven plug-in electric vehicles and 15 all-electric vehicles and equipment

VEHICLE FLEET

DOT has worked to reduce the size of its car fleet, and green the fuels used in its cars, trucks, and operational machinery.

CLEAN FUELS

DOT is working to reduce emissions through the use of cleaner fuels as mandated by PlaNYC and Local Law. In 2013, DOT bought the first ever diesel hybrid bucket truck, nine are now used on New York City streets. DOT operates eleven plug-in electric vehicles (Chevy Volts) and 15 all-electric vehicles and equipment. They include cars, forklifts, mini utility vehicles, an aerial lift, and two shop sweepers. The agency utilizes ultra-low sulfur

diesel fuel for diesel powered vehicles (and ferries—as outlined earlier in this chapter), and has begun using biodiesel fuel in certain vehicles. Biodiesel is a non-toxic, biodegradable fuel that has less greenhouse gas emissions. Between fiscal year 2012 and 2013, the agency increased its use of biodiesel fuel by 50% while lowering its total fuel consumption by 15%.

HUNTS POINT CLEAN TRUCKS PROGRAM

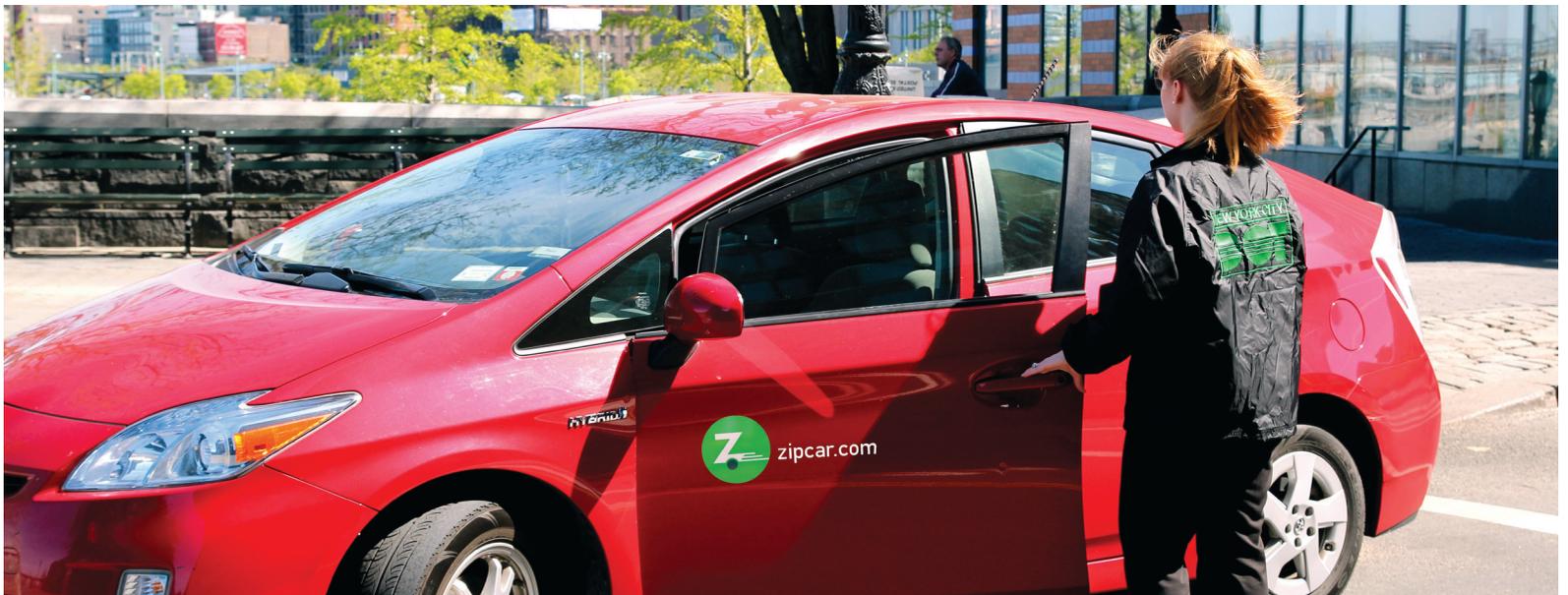
HUNTS POINT CLEAN TRUCK PROGRAM EMISSIONS REDUCTIONS

ANNUAL	NO (TONS/YEAR)	PM _{2.5} (TONS/YEAR)	HC (TONS/YEAR)	CO (TONS/YEAR)	CO ₂ (TONS/YEAR)
PERCENT REDUCED (%)	88.5%	97.5%	86.4%	80.2%	22.9
AMOUNT REDUCED PER YEAR	94.6	5.1	6.5	32	2631

The Hunts Point Clean Trucks Program is an environmental initiative led by NYCDOT to promote sustainable transportation and a cleaner environment in the South Bronx. The agency works with truck owners serving the Hunts Point and Port Morris communities and offers attractive rebate incentives for the purchase of advanced transportation technologies and alternative fuels such as new diesel, hybrid electric, compressed natural gas,

and battery electric vehicles. The rebates are available through a federal grant managed by NYCDOT. Rebate incentives are also available for truck scrappage and the installation of exhaust retrofit technologies. The program started in summer 2011 and has resulted in substantial pollution reduction benefits. As of summer 2013, there were over 200 private delivery vehicles in the program, bought with over 3.5 million in federal funds.

CAR SHARING



Working with Zipcar, DOT launched a car share pilot in 2010 to reduce the agency's fleet size, help combat global warming, and lessen the agency's parking footprint in Lower Manhattan. During the pilot, DOT removed 50 vehicles from its fleet and provided car sharing access to 350 employees. Given the successful

pilot, DOT renewed its contract and now is working to expand use of car sharing.

Based on this success, the program expanded, to 420 DOT staff with access to Zipcar in 2013. The employees used car shares for hundreds of trips a month and allowed DOT to reduce its standing car fleet.

DOT's car sharing pilot program:

- **Removed 25% of DOT vehicles from Lower Manhattan**
- **Reduced DOT parking impact in Lower Manhattan by 14% weekdays and 68% weekends**
- **Reduced DOT's miles traveled by 11%**



Looking Ahead

Continued progress on the infrastructure maintenance outlined above will require a substantial investment.

The agency's bridge reconstruction program for the next ten years totals \$4.3 billion. Over 70 bridges that would otherwise fall into "poor" condition are slated to be reconstructed over this time, including the Unionport Bridge in the Bronx and Roosevelt Avenue over the Van Wyck Expressway in Queens. Analysis of bridge conditions shows growing needs going forward, as more of our bridges age. Maintenance costs increase as bridges get older, so repairing bridges on time will save public funds in the long run.

The design process for three new Staten Island Ferry boats is underway to service the next generation of Staten Island Ferry riders. Procurement of those boats will cost \$300 million and require government resources—so far federal funding has not been secured.

An additional \$2.4 billion in city funds is programmed for street reconstruction and repaving, allocations that are necessary for the safe movement of buses, trucks, cars, and bicycles. PlaNYC's analysis showed that the City needs to resurface at least 900 lane miles per year in order to return the city's streets to a state of good repair, so anything less than this will have consequences in terms of safety, mobility and vehicle maintenance.

Sustaining these investment levels will be challenging. The needs above are in addition to those of the MTA, which runs subways, commuter trains and buses, and has a multi-billion dollar hole in its next capital construction program, and come at a time of eroding federal transportation aid. As a percentage of U.S. GDP, investment in infrastructure today is half what it was in 1960, according to the National Association of City Transportation Officials. The United States is investing approximately two percent of GDP on infrastructure; Europe and China are investing approximately five percent and nine percent. Growth in India, China, Brazil and other surging

economies is being fueled by investment in urban transportation systems while the U.S. lags behind.

But the region will have no option but to find revenue necessary. Ignoring vital bridge, road, and transit maintenance would have disastrous consequences on the region's mobility and economic vitality, as evidenced by the deterioration of the NYC subway system in the 70s and 80s. Deferring maintenance will also lead to higher costs in the long run.

New sources of revenue will be necessary, such as East River Bridge tolls or a congestion charging program that levies fees on drivers coming in Manhattan's central business district. (see Mobility Looking Ahead section).

The agency will also have to find ways to preserve its current investments, and reduce maintenance costs. Despite progress to protect recently repaved streets from construction work, streets are frequently torn up in New York or not repaired to adequate standards after construction. The Street Works Manual attempts to address this. Greater knowledge of and use of this document could help protect the city's street and bridge investments. The agency will also have to find new and innovative ways to communicate with New Yorkers about the core maintenance work it undertakes. The model set by The Daily Pothole could be expanded to other areas, and help make a case for the new revenue programs.

Realigning transportation infrastructure to better reflect the needs of the surrounding community could produce cost savings and offset previously inflicted impacts of large infrastructure projects. Turning the Sheridan Expressway in the South Bronx into a boulevard, as proposed by the city's Sheridan/Hunts Point Land Use and Transportation Study, would improve access to new parks along the Bronx River, greatly enhance safety, and provide new development opportunities. As vacant city land becomes scarcer, proposals to deck over other highways, like the Brooklyn Queens Expressway in Williamsburg or through Cobble Hill, could provide new opportunities for parks and housing.

NYC's commitment to the use of sustainable materials will produce environmental and economical benefits for the city, both in the short and long term. The agency is working towards using even higher percentage of recycled content in asphalt, warm mix asphalt technology and testing 100% recycled asphalt. The use of permeable pavement and bioswales has grown significantly, and may grow more once the durability of materials is further tested over the long term in a variety of street and sidewalk locations. The city's conversion to energy and cost efficient LED lights, which will be fully completed by 2017, means it is on track to become the first big city to have all of its street and park lights converted, producing savings over a longer period of time.

In addition to the bus, ferry, and bike projects outlined in the Mobility section, the Bloomberg Administration has also endorsed a number of larger scale transit expansion projects that are necessary for the region to grow and prosper. These include the a new Amtrak Gateway project which seeks to add intercity rail capacity to New York City and bringing MTA's Metro-North to Penn Station. The projects have higher price tags than new bus rapid transit or bike routes, but will be vital to the future of the city.

- **Continue to improve bridge and street conditions**
- **Better protect street and bridge repair investments and more widely publicize the Street Works Manual**
- **Consider new revenue streams like congestion pricing to pay for infrastructure needs**
- **Secure funding for the new generation of Staten Island Ferry boats**
- **Realign infrastructure to better reflect the needs of the surrounding communities, including transforming the Sheridan Expressway into a boulevard with housing, retail, and offices**
- **Expand use of recycled asphalt, permeable pavement, bioswales, and clean fuels**
- **Complete conversion of street lights to LEDs by 2017**
- **Expand car sharing**

